THE

AMERICAN JOURNAL

OF

SCIENCE AND ARTS.

EDITORS,

JAMES D. DANA, B. SILLIMAN, AND E. S. DANA.

ASSOCIATE EDITORS,

PROFESSORS ASA GRAY, WOLCOTT GIBBS AND J. P. COOKE, JR., OF CAMBRIDGE,

PROFESSORS H. A. NEWTON, S. W. JOHNSON, G. J. BRUSH AND A. E. VERRILL, OF NEW HAVEN,

PROFESSOR GEORGE F. BARKER, OF PHILADELPHIA.

THIRD SERIES.

VOL. XV.—[WHOLE NUMBER, CXV.]

Nos. 85—90.

JANUARY TO JUNE, 1878.

WITH TWO PLATES.

NEW HAVEN: EDITORS.

1878.

R v. 115 Jan. - June 1878

Reg

PRINTED BY TUTTLE, MOREHOUSE & TAYLOR, 371 STATE ST.

CONTENTS OF VOLUME XV.

NUMBER LXXXV.

Page

ART. I.—Contributions to Meteorology, being results derived from an examination of the Observations of the United States Signal Service, and from other sources; by ELIAS LOOMIS, Eighth paper. With plates 1 and 2,---------- 1

II.—Recent American Earthquakes; by C. G. ROCKWOOD, Jr., 21

III.—Under-water Oceanic Temperature; by G. E. BELKNAP, 27

IV.—Magnetic Effect of Electric Convection; by H. A. ROWLAND, ---------- 30

V.—Jupiter and its Satellites; by MARIA MITCHELL, ------- 38

VI.—Revision of the Atomic Weight of Antimony; by JOSIAH P. COOKE, Jr.,---------- 41

VII.—Pyrophosphorite: an Anhydrous Pyrophosphate of Lime from the West Indies; by C. U. SHEPARD, Jr.,---- 49

SCIENTIFIC INTELLIGENCE.

Chemistry and Physics.—On the Direct Combustion of Nitrogen, KÄMMERER: On the Relative Attraction of Oxygen for Hydrogen and Carbonous oxide, HORSTMANN, 51.—On the Sulphides of Platinum, RIBAN, 52.—On the Destructive Distillation of Phenol and Chlorbenzene, KRAMERS: Boracic Acid, M. L. DIEULAFAIT, 53.—Photo-electric Phenomena, R. BORNSTEIN, 54. HANKEL, 55.—Specific Heat of air at constant pressure and constant volume, H. KAYSER: Fluorescence of the Retina, 55.

Geology and Mineralogy.—Reports of the United States Geographical Surveys west of the One-hundredth meridian, 55.—Summary of field work of the United States Geological and Geographical Survey of the Territories, F. V. HAYDEN, 56.—Geology of Wisconsin, 61.—Probable ancient outlet of the Great Salt Lake: Siberian Steppes: Mikroskopische Physiographie der massigen Gesteine, H. ROSENBUSCH, 65.—A Guide to the Determination of Rocks, by E. JANNETAZ: Tables for the Determination of Minerals, by P. FRAZER, Jr.: Tridymite in Ireland: Anthracite of Pennsylvania, 66.

Botany and Zoology.—The Different Forms of Flowers on Plants of the same Species, C. DARWIN, 67.—Ferns of North America, D. C. EATON: Notes on Botrychium simplex, G. E. DAVENPORT, 72.—Researches in regard to the influence of light and radiant heat upon transpiration in plants, J. WIESNER: Ueber Botrydium granulatum: J. ROSTAFINSKI and M. WORONIN, 73.—Om Spetsbergens marina Klorofyll förande Thallophyter, 74.—Felci e Specie nei Gruppi affini raccolte a Borneo: Notes on Botrychium simplex *Hitch.*, G. E. DAVENPORT: Note on the Habits of young Limulus, A. AGASSIZ, 75.—New Species of Ceratodus, from the Jurassic; O. C. MARSH, 76.

Astronomy.—The November Meteors: On Schmidt's Nova Cygni, 76.—The Report of Professor Pickering, 77.

Miscellaneous Scientific Intelligence.—Norwegian Exploring Expedition: Translation of Weisbach's Mechanics, 78.—A New Treatise on Steam Engineering, etc.: A List of Writings relating to the Method of Least Squares, by M. MERRIMAN: Elements of the Method of Least Squares, by M. MERRIMAN: Royal Society, 79.

Obituary.—Jared Potter Kirtland, 80.

NUMBER LXXXVI.

Page

ART. VIII.—Photometric comparison of Light of different colors; by O. N. ROOD, ... 81
IX.—Echinoid fauna of Brazil; by RICHARD RATHBUN, ... 82
X.—Undulations observed in the tail of Coggia's Comet, 1874, by L. TROUVELOT, ... 84
XI.—Sudden extinction of the light of a Solar Protuberance; by L. TROUVELOT, ... 85
XII.—The Moon's Zodiacal Light; by L. TROUVELOT, ... 88
XIII.—Chemical Equivalents and Atomic Weights considered as bases of a system of Notation; by C. MARIGNAC, ... 89
XIV.—Some thoughts on the Glycogenic function of the Liver and its relation to vital force and vital heat; J. LECONTE, 99
XV.—Revision of the Atomic Weight of Antimony; by JOSIAH P. COOKE, Jr. (concluded), ... 107
XVI.—Two new species of Primordial Fossils; by S. W. FORD, 124
XVII.—Note on Lingulella cælata; by S. W. FORD, ... 127
XVIII.—Development of Olenellus asaphoides; by S. W. FORD, 129
XIX.—Schweitzer's "New Acid Ammonium Sulphates;" by S. W. JOHNSON and R. H. CHITTENDEN, ... 131
XX.—Poplars of North America; by SERENO WATSON, ... 135

SCIENTIFIC INTELLIGENCE.

Chemistry and Physics.—Liquefaction of Oxygen, M. RAOUL PICTET, 137.—Liquefaction of Oxygen, Nitrogen, and Hydrogen, 141.—Liquefaction of Acetylene, Nitrogen dioxide, and probably Marsh gas, CAILLETET, 142.—Flame-temperatures, ROSSETTI: Principle of Maximum Work, BERTHELOT, 143.—Hydrocarbon called Idryl, GOLDSCHMIEDT, 144.—Determination of Nitrogen in Nitroglycerin, LAUR and ADOR: Aromatic Hydantoins, SCHWEBEL, 145.—Behavior of Benzoic acid in the Organism of Birds, JAFFE: Le Sage's Theory of Gravitation, J. CROLL, 146.—Thermal Conductivity and Diathermancy of Air and Hydrogen, H. BUFF, 147.—Spectrum of the Electric Spark in compressed gases, CAZIN and WÜLLNER, 148.

Geology and Mineralogy.—Silurian Plants, by LEO LESQUEREUX: Modified drift in New Hampshire, by W. UPHAM, 149.—Ueber das Krystallsystem und die Winkel des Glimmers, von N. v. KOKSCHAROW: Die Glimmergruppe, TSCHERMAK, 150.

Botany and Zoology.—Hybridization of Lilies, by F. PARKMAN, 151.—Thuret's Garden: Dr. Engelmann's new botanical Papers: New range for two Orchids, WIBBE: Botanische Untersuchungen über Schimmelpilze, by O. BREFELD, 153.—Beiträge zur Entwickelungsgeschichte der Flechten, by E. STAHL: Acetabularia Mediterraneanea, by A. DE BARY and E. STRASBURGER, 155.—Entwickelungsgeschichte des Prothalliums von Gymnogramme leptophylla, by K. GOEBEL: New Species of Parasitic Green Alga, by E. P. WRIGHT: Transpiration in Plants: Japanese Lingula and Shell mounds, E. S. MORSE, 156.—The American Naturalist: Bulletin of the Nuttall Ornithological Club: Nests of "the Gardener," 158.

Astronomy.—Meteors observed in Cambridge, Mass.: Prize for the discovery of Comets, 158.—Index Catalogue of Books and Memoirs relating to Nebulæ and Clusters, &c., by E. S. HOLDEN, 159.

Miscellaneous Scientific Intelligence.—Telephone in England, 159.—Manual of Heating and Ventilation, by F. SCHUMANN: Mesmerism, Spiritualism, etc., historically and scientifically considered, by W. B. CARPENTER: The Telephone: Auguste de la Rive, 160.—*Obituary.*—Rhumkorff, 160.

NUMBER LXXXVII.

Page

ART. XXI.—Coggia's Comet, its Physical Condition and Structure; Physical Theory of Comets; by W. A. NORTON,.. 161
XXII.—Transmission of Earth Waves; by H. L. ABBOT,... 178
XXIII.—Systems of Chemical Notation; by BERTHELOT and MARIGNAC,..... 184
XXIV.—Reactions of Silver Chloride and Bromide; by M. C. LEA,..... 189
XXV.—Journal Friction at Low Speeds; by A. S. KIMBALL, 192
XXVI.—Brightness of the Satellites of Uranus,..... 195
XXVII.—Decomposition of Chromic Iron; by E. F. SMITH,. 198
XXVIII.—New genera of Pycnogonida; by E. B. WILSON,. 200
XXIX.—Tantalite from Coosa Co., Alabama; by J. L. SMITH, 203
XXX.—Amylidenamine Silver Nitrate; by W. G. MIXTER,. 205
XXXI.—Crystallization of Variscite; by A. H. CHESTER,... 207
XXXII.—A New Planet; by C. H. F. PETERS,..... 208
XXXIII.—New Dinosaurian Reptiles; by O. C. MARSH,.... 241

SCIENTIFIC INTELLIGENCE.

Chemistry and Physics.—New mode of determining Vapor Densities, NAUMANN, 208.—New Oxide of Sulphur, Persulphuric oxide, BERTHELOT, 209.—Formation of Ammonium Nitrite in Combustion, ZÖLLER and GRETE: Fluoranthrene, a hydrocarbon from Coal tar, FITTIG and GEBHARD, 210.—Simple synthesis of Formic acid, MERZ and TIBIRCA: Constitution of Nicotine, LAIBLIN: Chemical Philosophy, 211.—Laws governing the Formation of Ethers, MENSCHUTKIN, 213.—Solid Hydrogen, Density of Liquid Oxygen, PICTET, 214.—Effect of Light and Heat upon the electrical resistance of Selenium, SIEMENS: Influence of Light upon the electrical resistance of Metals, HAUSEMANN: Electromagnetic and Calometric absolute measurements, WEBER, 215.—Notes from the Chemical Laboratory of the Johns Hopkins University, 216.

Geology and Mineralogy.—Wisconsin Geological Survey: Geological Survey of New Jersey, 216.—United States Geological and Geographical Survey, 217.—Geographical and Geological Survey of the Rocky Mountain Region: Variations of the Decorticated Leaf-scars of certain Sigillariæ: Elements of Geology, 218.—Fossil Flora of the Western Territories: The rocks of the "Chloritic formation" on the western border of the New Haven Region, G. W. HAWES: Elevated Quaternary beds of Grinnell Land and North Greenland, 219.—A Seal from the Leda Clay (Champlain beds) of the Ottawa valley: Mineralogy and Petrography of Boston and vicinity, M. E. WADSWORTH: Samarskite from Mitchell Co., North Carolina, C. F. RAMMELSBERG, 220.

Botany and Zoology.—Supplementary Note to the Review of Darwin's "Forms of Flowers," 221.—Historia Filicum, 222.—Ferns of North America: List of Fungi found in the vicinity of Boston, 223.—Journal of the Linnean Society: Guide du Botaniste in Belgique: Insect-fertilization in Trichostema, 224.—Botanical Necrology of 1877: Desmidieæ et Œdogonieæ, 225.—A new Species of Chimæra from American waters, T. GILL: Dr. W. M. Gabb on Dr. Warring's paper on the growth-rings of exogenous plants a proof of alternating seasons, 226.

Astronomy.—Age of the Sun, J. CROLL, 226.—Photographs at the Cordoba Observatory, B. A. GOULD, 230.—Moon's Zodiacal Light, E. S. HOLDEN, 231.

Miscellaneous Scientific Intelligence.—Address of the President of the Royal Society, 231.—Hermetically-sealed Flasks opened on the Alps, 235.—Effect of Light upon Bacteria and other Organisms, A. DOWNES and T. P. BLUNT, 236.—Expenditures for Universities in Germany, 237.—Earthquake of Nov. 15, 1877, 238.—Geological Survey of India, Palæontologia Indica: Volunteer Weather Service: Beiblätter zu den Annalen der Physik und Chemie, 239.

Obituary.—Antoine César Becquerel, 239.—Henri Victor Regnault, 240.

NUMBER LXXXVIII.

Page

ART. XXXIV.—Surface Geology of Southwest Pennsylvania; by J. J. STEVENSON, ... 245

XXXV.—The Driftless Interior of North America; by J. D. DANA, ... 250

XXXVI.—The Ancient Outlet of Great Salt Lake; by G. K. GILBERT, ... 256

XXXVII.—Projection of Microscope Photographs; by J. C. DRAPER, ... 259

XXXVIII.—Lower Silurian Fossils in Limestone associated with Hydromica slates in Pennsylvania; by F. PRIME, Jr., 261

XXXIX.—Influence of Temperature on the Optical Constants of Glass; by C. S. HASTINGS, ... 269

XL.—Experiments with Floating Magnets; by A. M. MAYER, 276

XLI.—Intrusive Nature of the Triassic Trap Sheets of New Jersey; by I. C. RUSSELL, ... 277

XLII.—Absolute Unit of Electrical Resistance; by H. A. ROWLAND, ... 281

XLIII.—Croll's Hypothesis of the Origin of Solar and Sidereal Heat; by D. KIRKWOOD, ... 291

XLIV.—Chemical Composition of Guanajuatite, a Selenide of Bismuth from Guanajuato; by J. W. MALLET, ... 294

XLV.—Janssen Solar Photograph and Optical Studies; by S. P. LANGLEY, ... 297

XLVI.—Tree-like Fossil Plant, Glyptodendron, in the Upper Silurian Rocks of Ohio; by E. W. CLAYPOLE, ... 302

SCIENTIFIC INTELLIGENCE.

Chemistry and Physics.—Fundamental Thermo-chemical Data, BERTHELOT, 304.—Relations between the Atomic Weights of the Elements, WÆCHTER: Preparation of Nitrogen, GATEHOUSE: Method of separating Crystallized Silica, especially Quartz, from Silicates, LAUFER, 305.—Stannous Chloride in the analysis of Nitro-compounds, LIMPRICHT: Catalytic action of Carbon Disulphide, HELL and MÜLHÄUSER, 306.—Conversion of Nitriles into Amides, PINNER and KLEIN: Quercite a Pentacid Alcohol, HOMANN: Acids of Cocoa Butter, KINGZETT, 307. New Class of Acid Salts, VILLIERS: Electro-Magnetic and Calorimetric Absolute Measurements, H. F. WEBER: Chemical Dynamics, C. R. A. WRIGHT and A. P. LUFF, 308.—Nitrification: Haloid Compounds of Antimony, J. P. COOKE, Jr., 310.—The Telephone, an Instrument of Precision, G. FORBES, 312.

Geology and Mineralogy.—Driftless Region of the Northwest, R. D. IRVING, 313.—Second Geological Survey of Pennsylvania, 314.—Ancient Life-history of the Earth, 315.—United States Exploration of the 40th Parallel: Clay Deposits of New Jersey, 316.—First and Second Glacial Eras of Europe: Cordaites with flowers from the Coal-region of Pennsylvania: Mineral Caves of Huallanca, Peru, H. SEWELL, 317.—Homilite, 318.

Botany and Zoology.—Flora of Tropical Africa, 318.—Ferns of North America: Fossil Plants of Sierra Nevada, 319.—Elias Magnus Fries: Museum of the Pharmaceutical Society of Great Britain: Thuret's Garden at Antibes: Circumspection of Ants, Prof. LEIDY, 320.—Carboniferous Articulates of Illinois: Anatomy of Invertebrated Animals: Nomenclature in Zoology and Botany: A Pigeon living after the removal of nearly all the Brain, 321.

Miscellaneous Scientific Intelligence.—Earthquake of November 4, 1877, DAWSON, 321. *Obituary.*—Charles Frederick Hartt: Angelo Secchi, 324.

NUMBER LXXXIX.

Page

ART. XLVII.—Research on the Absolute Unit of Electrical Resistance; by HENRY A. ROWLAND, ... 325
XLVIII.—Meteoric Iron from Virginia; by J. W. MALLET, .. 337
XLIX.—Relative Positions of the Forest Bed and associated Drift Formations in Northeastern Iowa; by W. J. MCGEE, 339
L.—Geographical and Geological Survey of the Rocky Mountain Region, under the direction of J. W. Powell, . 342
LI.—Just Intonation in Music; by H. WARD POOLE, ... 359
LII.—Brachiopoda in the Swedish Primordial; by S. W. FORD, 364
LIII.—On the "Geodes" of the Keokuk Formation, and the Genus Biopalla; by SAMUEL J. WALLACE, ... 366
LIV.—The Coralline, or Niagara Limestone of the Appalachian System; by S. T. BARRETT, ... 370
LV.—Isopoda from New England; by OSCAR HARGER, ... 373
LVI.—Ammonio-argentic Iodide; by M. CAREY LEA, ... 379
LVII.—Fossil Passerine Bird from Colorado; by J. A. ALLEN, 381
LVIII.—Terrestrial Electrical Currents; by W. L. BROUN, .. 385
LIX.—Notice of New Fossil Reptiles; by O. C. MARSH, ... 409

SCIENTIFIC INTELLIGENCE.

Chemistry and Physics.—Specific Heat of Beryllium, NILSON and PETTERSSON: Synthesis of Olefines, ELTEKOFF, 386.—Transformation of Olefine bromides into bromides of radicals of the Fatty Acids, DEMOLE: Reaction of Boric acid and Borax, etc., KLEIN, 387.—Distillation of Resins and resin acids with zinc dust, CIAMICIAN: Triacid Phenols of Wood Tar, etc., HOFMANN, 388.—Constituents of Corallin, ZULKOWSKY: Curarine, SACHS: Protection of Marine Boilers, 389.—Boracic Acid, M. A. DITTE, 390.—Boiling Point of Iodide of Antimony, 391.—Influence of the density of a body upon its Light-absorbing power, GLAN: Reflection of Polarized Light from the Equatorial surface of a Magnet, KERR: Method of measuring the Velocity of Light, A. A. MICHELSON, 394.

Geology and Mineralogy.—Limestones of the Falls of the Ohio, JAMES HALL, 395.—Fossil Plants of the Auriferous Gravel Deposits of the Sierra Nevada, L. LESQUEREUX: Fossil wood from the Keokuk formation, S. J. WALLACE: Atlas accompanying the Report of the Geological Exploration of the Fortieth Parallel. C. KING, 396.—Geological and Geographical Atlas of Colorado, F. V. HAYDEN: Genera Zethus, Cybele, Encrinurus and Cryptonomus, A. W. VOGDES, 397.—Carboniferous and Upper Silurian fossils of Illinois and Indiana, C. A. WHITE: Culm-Flora der Ostrauer und Waldenburger Schichten, D. STUR: Remains of the Musk Ox: Three new Phosphates from Fairfield County, Conn., G. J. BRUSH and E. S. DANA, 398.—General Principles of Mineralogy, J. H. COLLINS, 399.

Botany and Zoology.—Synoptical Flora of North America, GRAY: Bibliographical Index to North American Botany, S. WATSON, 400.—Some points in the Morphology of Primulaceæ, M. T. MASTERS: Origin of Floral Æstivations, etc., G. HENSLOW, 401.—Floral Structure and Affinities of Sapotaceæ, M. M. HARTOG: North American Plants: Spore-Formation of the Mesocarpeæ, V. B. WITTROCK, 402.—Non-Sexual Outgrowths on Fern Prothalli, 403.—Catalogue of the Flowering Plants within thirty miles of Yale College, 404.

Astronomy.—Der Sternhaufen χ Persei, etc., H. C. VOGEL, 404.—American Journal of Mathematics: Publications of the Cincinnati Observatory, 406.

Miscellaneous Scientific Intelligence.—Driftless Region of Wisconsin, 406.—Treatise on Chemistry, H. E. ROSCOE and C. SCHORLEMMER: Report of the Superintendent of the Coast Survey for 1874: Minnesota Academy of Natural Sciences: Matter and Motion, J. C. MAXWELL: Contributions to North American Ethnology, S. POWERS, 407.—*Obituary.*—CHARLES PICKERING, 408.

NUMBER XC.

Page

ART. LX.—Transmission of Sensation and Volition through the Nerves; by M. M. GARVER, ... 413

LXI.—Upper Devonian Rocks of Southwest Pennsylvania; by J. J. STEVENSON, ... 423

LXII.—Absolute Unit of Electrical Resistance; by H. A. ROWLAND, ... 430

LXIII.—Ancient Outlet of Great Salt Lake; by A. C. PEALE, 439

LXIV.—Ferment-theory of Nitrification; by F. H. STORER, 444

LXV.—J. W. Powell's Geographical and Geological Survey of the Rocky Mountain Region, ... 449

LXVI.—Transit of Mercury; by JOHN RODGERS, ... 455

LXVII.—Transit of Mercury; by S. P. LANGLEY, ... 457

LXVIII.—Fossil Mammal from the Jurassic of the Rocky Mountains; by O. C. MARSH, ... 459

LXIX.—Shale recently discoverd below the Devonian Limestones at Independence, Iowa; by S. CALVIN, ... 460

LXX.—Joseph Henry, LL.D., ... 462

LXXI.—Letter from B. A. GOULD, Director of the Cordoba Observatory, ... 468

SCIENTIFIC INTELLIGENCE.

Chemistry and Physics.—Expansion of the Solid Elements a Function of their Atomic weight, WIEBE, 472.—Gallium, LECOQ DE BOISBAUDRAN, 473.—Dimethylethylene, or normal Butylene, ETARD, 474.—Oil of Tansy and Oil of Valerian, BRUYLANTS, 475.—Xanthin-like bodies from Albuminates in Pancreatic Digestion, SALOMON: Present Condition of Electrical Meteorology, PALMIERI, 476.—Floating Magnets: Note on Floating Magnets, A. M. MAYER, 477.

Geology and Mineralogy.—Supplement to the Second Edition of Acadian Geology, J. W. DAWSON, 478.—Recherches expérimentales sur les cassures qui traversent l'écorce terrestre, M. DAUBRÉE, 450.—New Phosphate from Fairfield County, Connecticut, G. J. BRUSH and E. S. DANA, 481.—Mineralogische Mittheilungen, vom RATH: Das Erdbeben von Herzogenrath am 24 Juni, 1877, Dr. VON LASAULX: Die Mineralogie, VON KOBELL, 482.

Botany and Zoology.—Early Introduction and Spread of the Barberry in Eastern New England, 482.—Ferns of North America, D. C. EATON, 483.—Dictionnaire de Botanique: Vargas considerato como Botanico: Dr. Thomas Thomson, 484.

Astronomy.—Transit of Mercury, 484.

Miscellaneous Scientific Intelligence.—International Geological Congress: National Academy of Sciences, 485.—United States National Museum: Payen's Manual of Industrial Chemistry: Smithsonian Institution: American Association: British Association; Rate of Earthquake Wave Transit, 486.

INDEX, 487.